

***United States Joint Forces Command
Joint Warfighting Center
Simulation Support
to
Homeland Security and Defense***

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10.03.2003

SIM/C4 Program Strategy

Purpose

Inform the Homeland Security and Defense Simulation Constituency about the Joint Warfighting Center mission, capabilities, and initiatives for Joint and Interagency Modeling and Simulation, supporting systems, and federation development, as well as M&S and systems integration

JWFC Mission

Joint Forces Command's Joint Warfighting Center improves Joint readiness by providing world-wide training and training support, assisting in the preparation of integrated and interoperable forces for future Joint and multinational operations; provides management and integration of Joint capable models and simulations; and provides leadership in the development of Joint doctrine and Joint training initiatives.

Supported Organization Requirements

- Support to Training Transformation
- Support to Homeland Security and Defense
- Multi-level echelon and architecture resolution
- Multiple levels of permissions and security
- Increased permanent network infrastructure
- Rapid event distributed simulation database build
- Integration w/ C4I systems (today and tomorrow)
- Improving fidelity and veracity
- Course of action analysis & mission rehearsal
- Integration with other off-the-shelf models and simulations

Simulation Support for Homeland Defense

Concept

- Enhance and expand JWFC simulation “tool-box,” to better support Dept of Defense, NORTHCOM-Joint and NORTHCOM-US Gov Organization Interagency training

Objectives

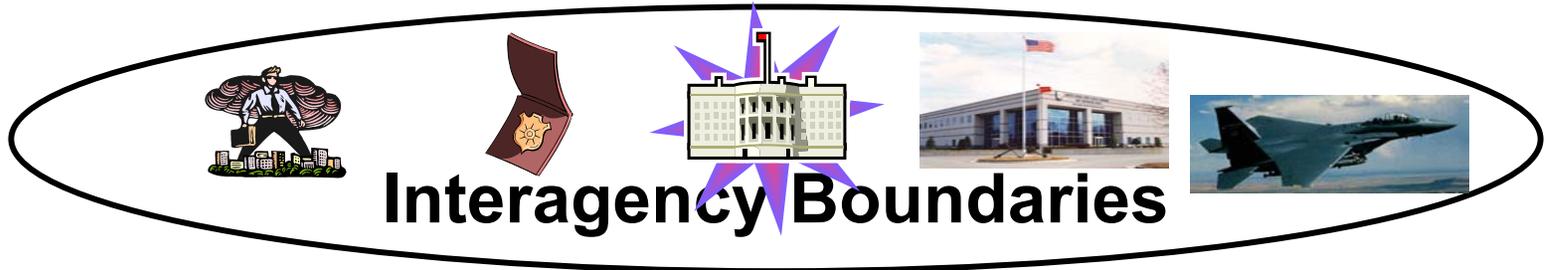
- Multi-Echelon Sim-C4 stimulation including Federal, State, and Local Govt
- Better Representation of critical functional aspects of security, defense, response and consequence management
- Better representation of threats and effects anticipated in Homeland Defense

Level of Effort and way ahead

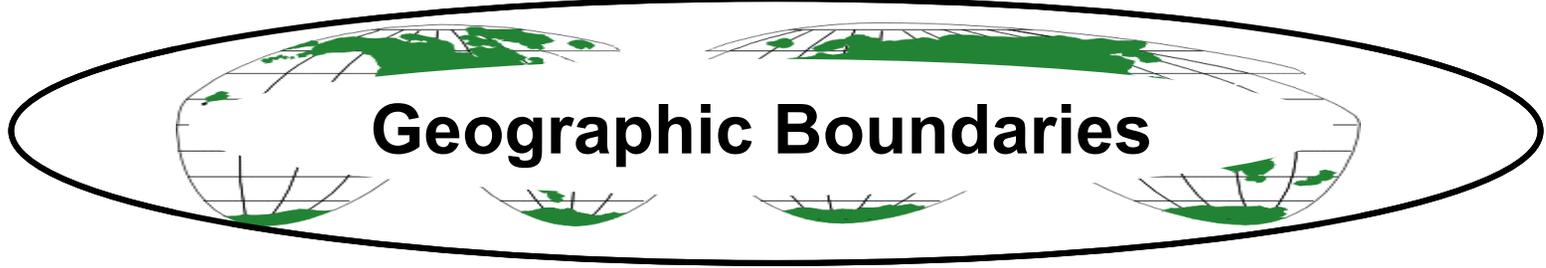
- Will require phase, multi-faceted analysis
- Will require funding of internal development and external projects

Simulation Support for Homeland Defense

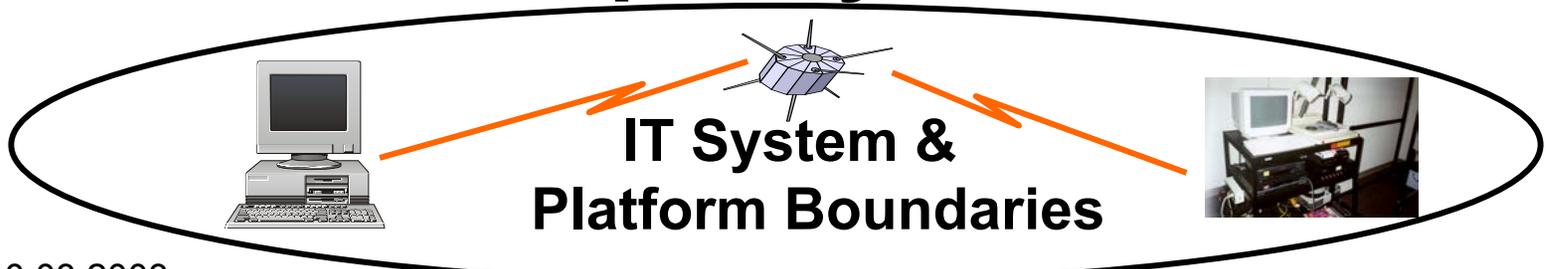
Multiple Organizations



Multiple Regions



Multiple Systems



Critical SIM/C4 Requirements

- Multi-echelon and cross-functional simulation across the spectrum of conflict from peace, through security, to open warfare
- Distributed training capability, via Web-enabling, in support of Joint, Combined and Interagency requirements
- Rapid, distributed, database development in support of training and mission rehearsal
- Live, virtual, constructive simulation capability spanning both the vertical echelons and inter-service and inter-agency activities
- Enhanced Joint Event Life Cycle support and services for Joint Force and Interagency Trainers, the Joint National Training Capability and Joint Force Commanders

JWFC Managed Systems Overviews

- **Model Description**
- **Unique Capabilities**
- **Current Version and Features**
- **Next Version Enhancements**
- **User Community Members**
- **Identified Shortfalls**

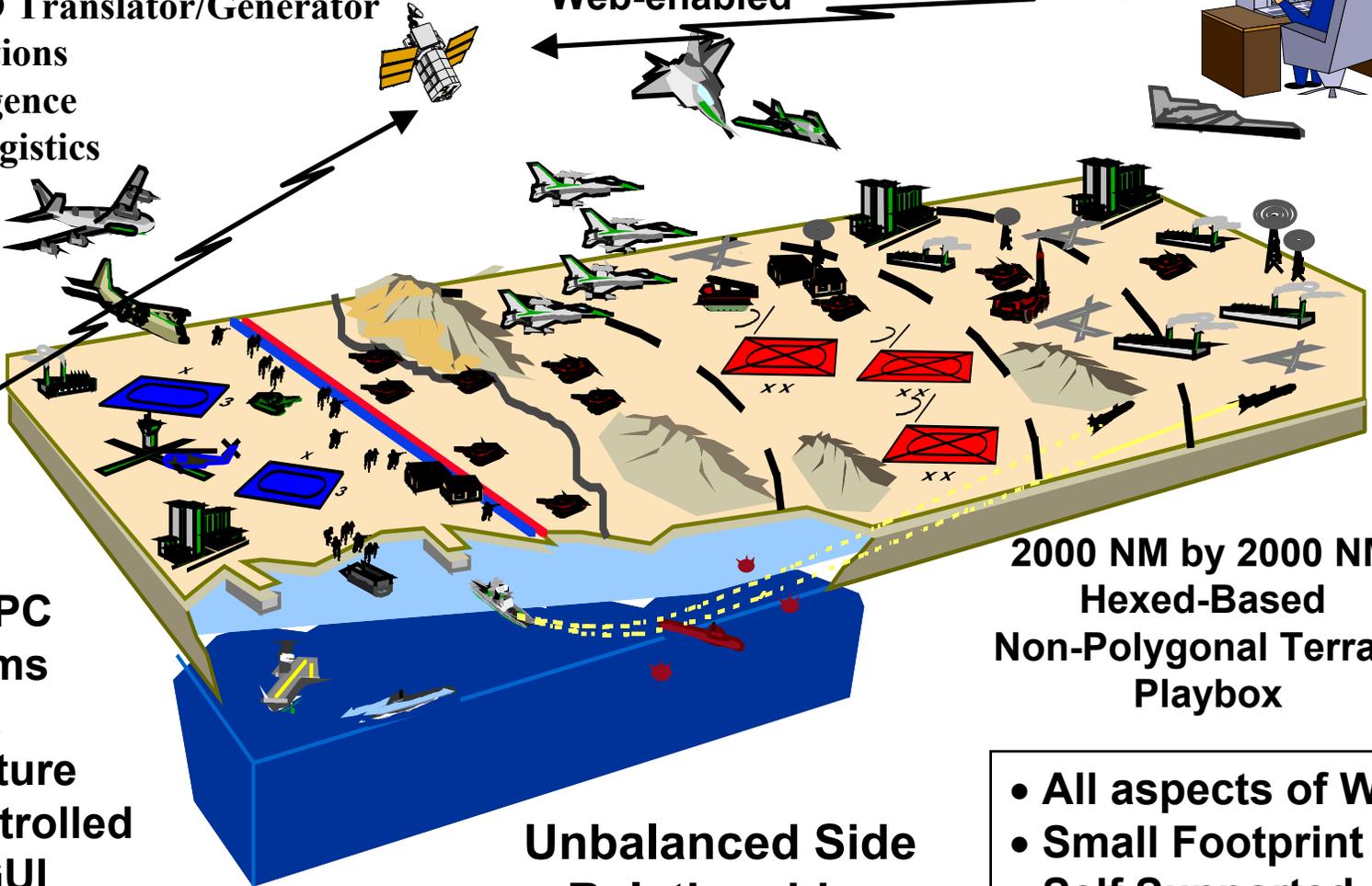
Joint Theater Simulation System (JTLS)

Integrated Joint Environment

Ground-Ops Large Forces
 Air Ops-ATO Translator/Generator
 Naval Operations
 Fused Intelligence
 Expanded Logistics

Stand-alone
 Distributed
 Web-enabled

Variable
 Speed/
 Updates



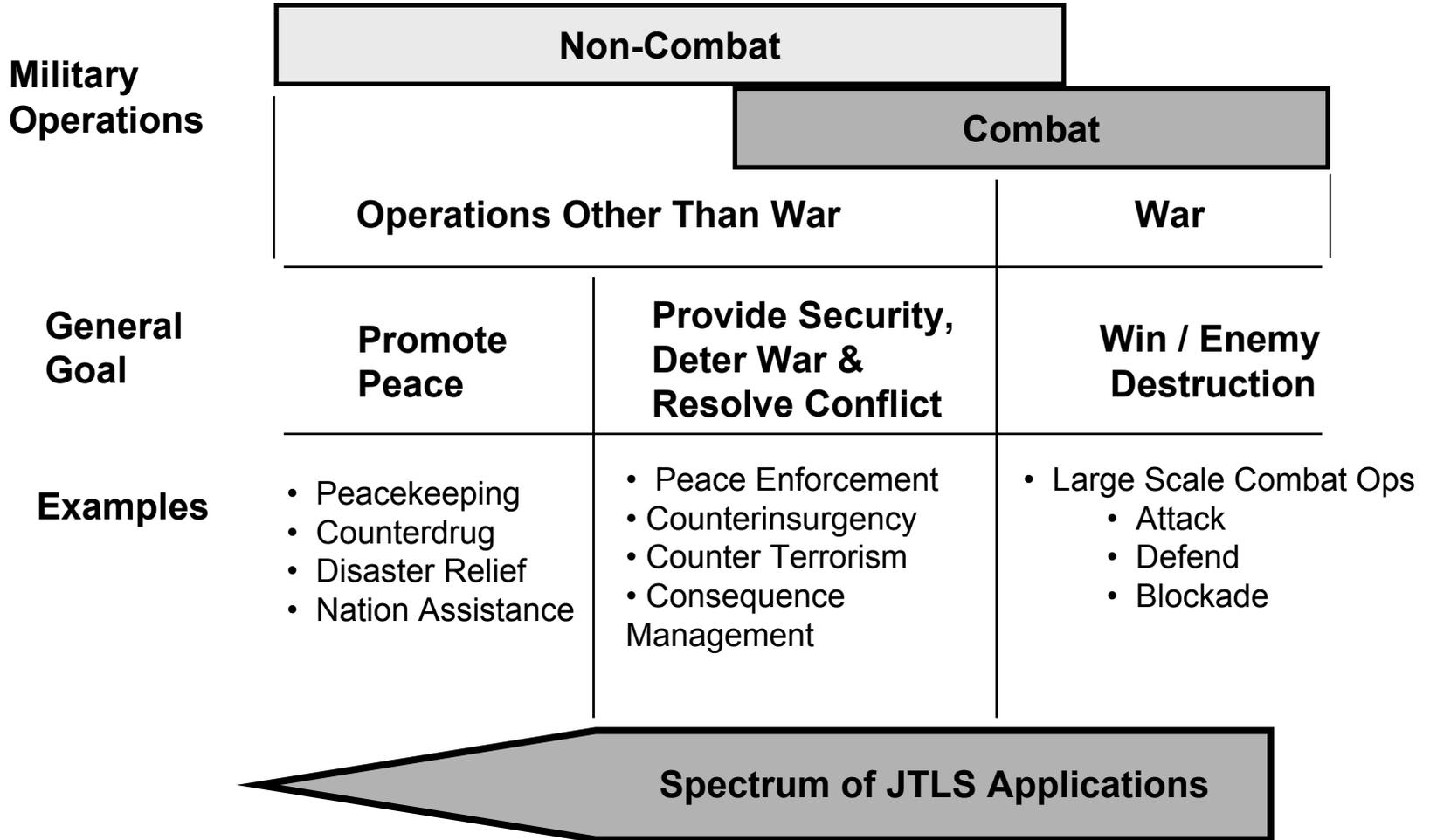
2000 NM by 2000 NM
 Hexed-Based
 Non-Polygonal Terrain
 Playbox

SUN & PC
 Platforms
 UNIX
 Architecture
 Mouse Controlled
 GIAC GUI
 Web-enabled GUI

Unbalanced Side
 Relationships
 (Side Perception)

- All aspects of War
- Small Footprint
- Self Supported
- Inexpensive

Range of Operations



JTLS Unique Capabilities

- **Integrates Air, Land, and Sea environments into a single simulation with Logistics, Intelligence, and SOF capability**
- **Multi-Sided with unbalanced side relationships and detailed ROE**
- **Simulates large scenarios with small exercise support footprint**
- **Web-Enabled Distribution**

Current Version - JTLS 2.5

- **Version 2.5 released Jan 02**
- **Model Enhancements**
 - Improved Air Play
 - Expanded ground mobility
 - Order Verification Tool
 - Improved Electronic Warfare
 - Open Access Reporting
 - JTLS Port to LINUX (PACOM funded)
 - Interim Web-enabled Interface (JWFC funded)
 - JTLS-JCATS HLA Federation Prototype (DMSO funded)

Next Version - JTLS 3.0

- **Version 3.0 scheduled for release in Dec 03**
- **Anticipated Upgrades:**
 - DMPI Targets
 - Capture and Surrender Capability
 - Improved Naval and Amphibious Play
 - Weather and Night Factors for Area Weapons
 - Compute Artillery Radius of Fire
 - JTLS-JCATS Operational HLA Federation (DMSO funded)

JTLS Identified Shortfalls

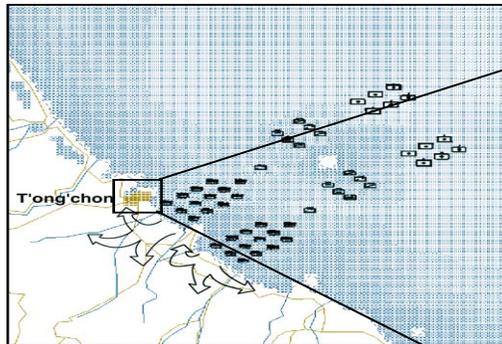
- **Hex-based terrain limits fidelity of ground combat to Battalion sized units and larger**
- **Model does not provide all message formats desired by the training audience**
- **Air Model is not able to directly update TBMCS**

JCATS - A Description

FOCUS: Tactical Level of War (JTF Level)

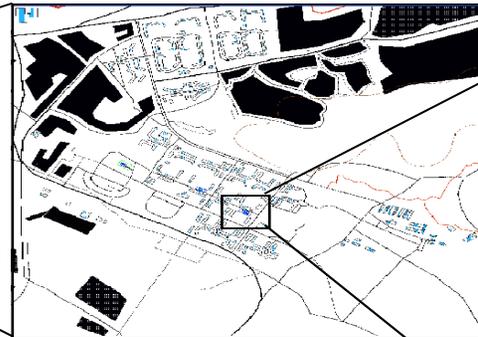
A multi-service, multi-sided, interactive, entity-level simulation used by military and security organizations as a tool for joint training, analyses, experimentation, planning and mission rehearsal.

Operational



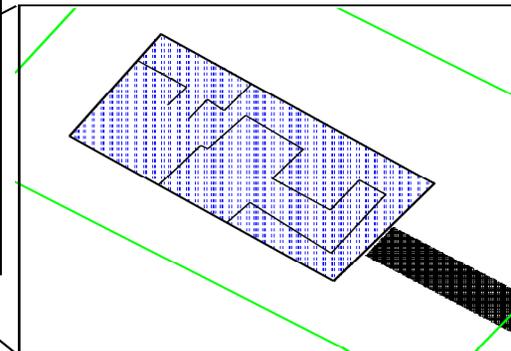
1. Campaign view. Terrain boxes can encompass 2400 km x 2400 km

Tactical



2. City view. Zoom in to see city details, roads, rivers, and foliage

Entity



3. Bldg. View. Zoom in again to show individual buildings, floor plans, interior walls, doors, and windows.

Users include Regional Combatant Commanders, SOCOM, Services, Secret Service, Analytical Command, Experimental Community, etc...

Range of Operations

	Non-Combat		
Military Operations			Combat
	Operations Other Than War		War
General U.S. Goals	Promote Peace	Provide Defense Deter War & Resolve Conflict	Conduct Open Warfare
	<ul style="list-style-type: none"> • Peacekeeping • Counter-drug • Disaster Relief <ul style="list-style-type: none"> – Floods – Earthquake – Nation Assistance – Civil Support – Evac Plans – Crowd Control – Logistics • Area/Bldg Security 	<ul style="list-style-type: none"> • Peace Enforcement • Spt Counterinsurgency • Counter-terrorism <ul style="list-style-type: none"> – NEO/Hostages – Raids – Strike • Crowd Control • Nuc/Chem/Bio • NEO/Hostages 	<ul style="list-style-type: none"> • Large Scale Combat Ops <ul style="list-style-type: none"> – Attack – Defend – Blockade
Examples Urban & Rural Environments			

Lethal-Nonlethal Spectrum of JCATS Applications



JCATS Unique Capabilities

- **Integrated Air, Land, and Sea domains into a single simulation that can operate on a single server/client platform or 50 plus W/S LAN**
- **10-Sided with balanced side relationships and detailed ROE**
- **30,000+ entities (systems, aggregates) to-date**
- **Variable digitized polygonal terrain using center of earth generator to provide unlimited terrain box (2400km x 2400km)**
- **Urban environment with multi-floor buildings with interior doors, walls, windows and underground features such as tunnels, caves, garages, bunkers (systems move within structures, tunnels).**
- **Dynamic environment changes (ceilings, winds, etc)**
- **Direct / Indirect fires based on line-of-sight acquisitions via EO, thermal, see thru wall sensors during variable lighting system**
- **Dynamic force insertion capability**
- **HLA and Two-Way DIS capable to include links to GCCS**
- **Dynamic control of workstations and game play**
- **Proven highly reliable with a variable run time and 1 sec or more data updates**

Current Version - JCATS 4.0

- **Delivered: 1 Oct 2003**
- **Upgrades**
 - Improved Crash Recovery
 - Improved SimExec for multiple workstation support
 - Improved LAN Data Handling
 - Connectivity Bridge (Remote Operations) Improvements
 - New Target Acquisition Algorithm
 - HLA Connectivity with other Federates
 - Global Coordinate System Terrain Generation Engine
 - Shape, Compressed Terrain Database (CTDB), ASCII file imports
 - Indefinite fuel/ammo global switches
 - Log data for other federate logistics class Roll-up Reports

Next Version - JCATS 5.0

- **Nov '03 release**
- **Anticipated Upgrades**
 - JCATS Top-Down Hierarchy System
 - JCATS-JTLS Federation (DMSO Funded)
 - JCATS-Joint Deployment Logistics Model (JDLM) Federation (EUCOM Funded)
 - JCATS-CBS Federation (Army Funded)

User Status

95 Major JCATS Users at 150 plus sites

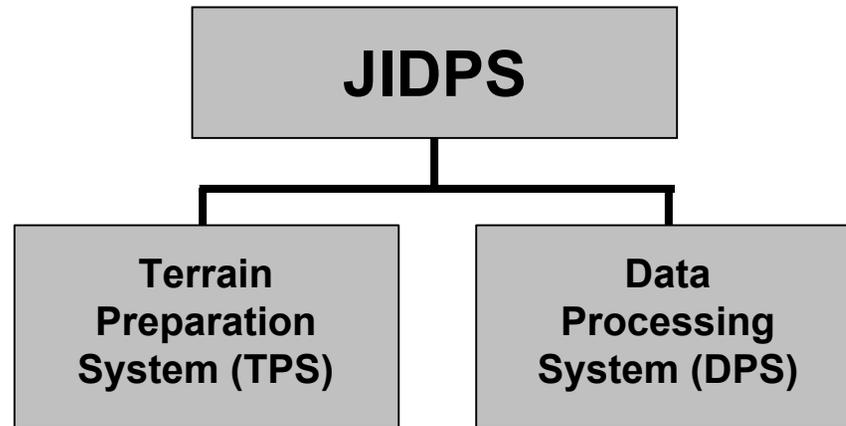
- **6 Unified Commands: JFCOM, CENTCOM, EUCOM (8), PACOM (3), SOCOM, SOUTHCOM**
- **4 Service Branches: USA (52), USMC (5), USAF (14), USN (6)**
- **3 Other DoD Organizations (OSD, DTRA, , DARPA, DMSO)**
- **3 Non-DoD Organizations (USSS, DOE, DOJ)**
- **Uses**
 - **Formal School House Training: 40**
 - **Training and Exercises: 12**
 - **Analyses: 115**
 - **Experimentation: 4**

JCATS Identified Shortfalls

- **Can be resource intense when played at Brigade level and above under certain conditions**
- **Aggregated Units can be played to higher echelon and numbers but may not allow for “fair fight” (acquisition from center of mass)**
- **Can play logistics loads/movements but actual usage by systems is limited to ammo and fuel only**
- **Play does not provide any visible messages to users - requires direct operator interaction with GUI and data spreadsheet reports**
- **No link with TBMCS exists**
- ***Many of the above shortfalls may be overcome when JCATS is federated and used in conjunction with JTLS***

JIDPS Description

- The Joint Integrated Database Preparation System (JIDPS) is a simulation database production application :
 - Accesses and retrieves data from various data sources
 - Creates simulation-ready files
- Targets production of database files that routinely change:
 - Terrain
 - Forces
 - Targets



- Terrain file production

- Order of battle
- Unit generation
- Unit equipment
- Target Generation
- Other non-terrain data

JIDPS Capabilities

- **Joint Theater Level Simulation (JTLS) data**
 - Unit, Facility and Target Files
 - Units
 - Order of battle
 - Tactical Unit Prototypes
 - Targets
 - Terrain file production
 - Feature data
 - Elevation
- **Joint Conflict and Tactical Simulation (JCATS) data**
 - Terrain file production
 - Feature data
 - Elevation
 - Building shells
- **Corps Battle System (CBS) data**
 - Red, blue, and template scenario independent files (SIF)
- **Exercise Modernized Integrated Database (MIDB) XML flat files**
 - Four exercise-specific files (EQP, EQP_IDX, UNIT, FAC)
- **Target list XML flat files**
 - Facilities
 - Fixed Targets

Current Version – JIDPS 3.3

- **Released 12 Nov 02**
- **Upgrades**
- **More Data Sources**
 - **Produces notional terrain from real-world data**
 - **Delivered to users via four JDL servers**
 - **Enhanced Terrain Web-site**

Next Version – JIDPS 3.4

- **Scheduled for 31 Oct 03 release**
- **Anticipated upgrades**
 - **Produce and consume ArcInfo Shape files**
 - **User selection of feature types**
 - **User selectable default elevation**
 - **Multiple inset JCATS playboxes**
 - **Improve terrain queue and archive**

User Community

- **MOA with 43 commands/ organizations**
 - 4 - **Combatant Commands**
 - 1 - **Sub-Unified Command**
 - 3 - **Staff Service Schools/War Colleges/Military Academies**
 - 3 - **Major Component Command Training Centers**
 - 4 - **Air Force Commands/Schools/Activities**
 - 17 - **Army Schools Commands/Schools/Activities**
 - 3 - **Marine Corps Commands/Schools/Activities**
 - 1 - **Navy Commands/Schools/Activities**
 - 4 - **Other DOD Organizations**
 - 3 - **National Laboratory/DOE Activity**
- **Primary use is JCATS terrain production**

Identified Shortfalls

- Force and target data source shortfall
 - Modernized Integrated Database: Severe shortfalls at Defense Intelligence Agency Database Systems
 - Configuration control
 - Consistency
 - Completeness
- Lack of use of Data Preparation System module
- Terrain production support for non-DOD activities with non-DOD source data

JTLS – JCATS HLA Federation

Concept

Develop an High Level Architecture (HLA) federation between Joint Theater Level Simulations (JTLS) and Joint Conflict and Tactical Simulation (JCATS) to offer the training audience the capability to conduct multi-echelon training from the operational to the tactical level

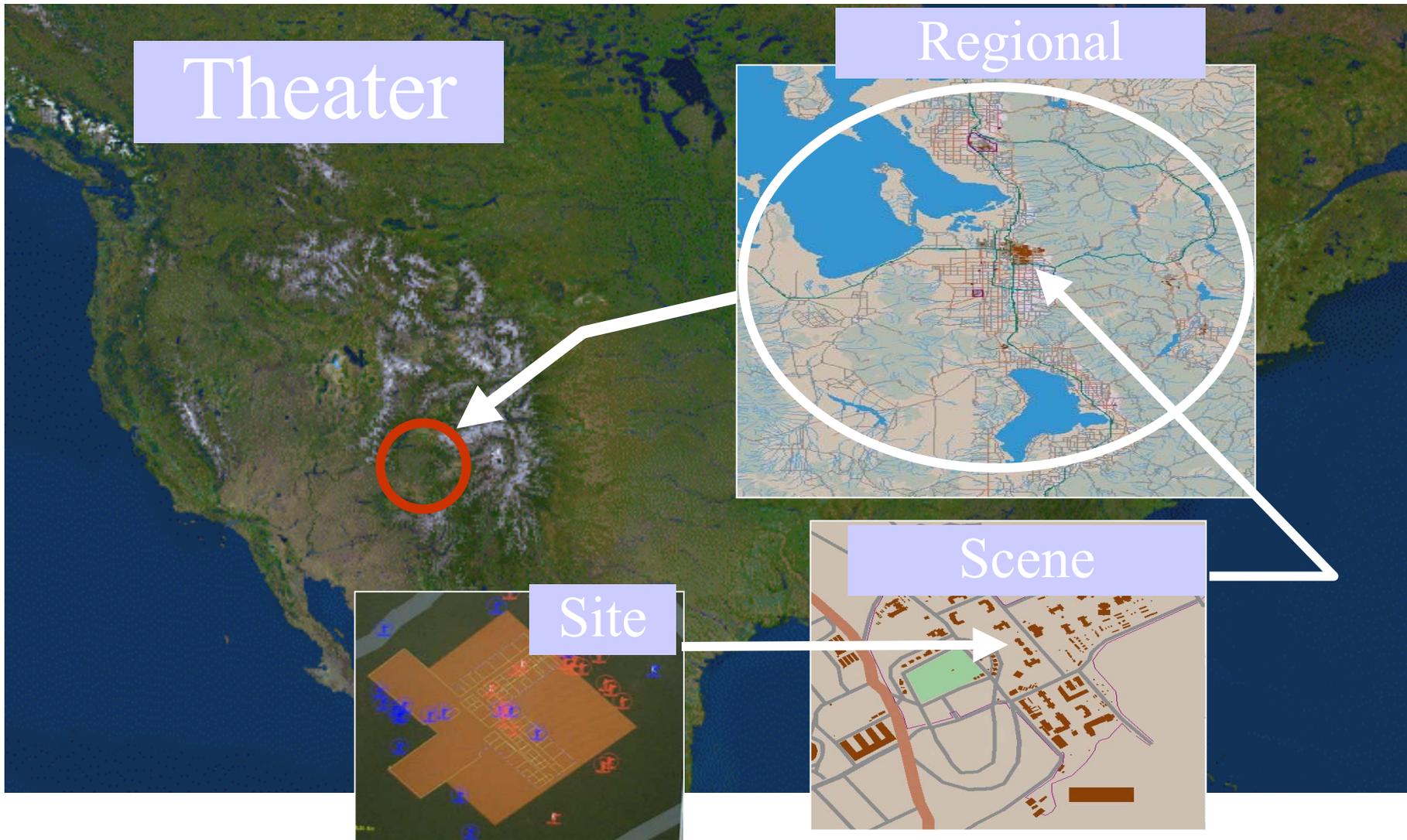
Objectives

- **True HLA Federation involving shared ownership of forces and objects**
- **Prepare the Federation for acceptance and identify opportunities for operational use**
- **Implement JTLS-JCATS HLA Federation in current and emerging user communities**

Level of Effort

- **Funded for June delivery of critical functionalities for operational use**
- **Several enhanced features deferred pending additional funding of \$600K**

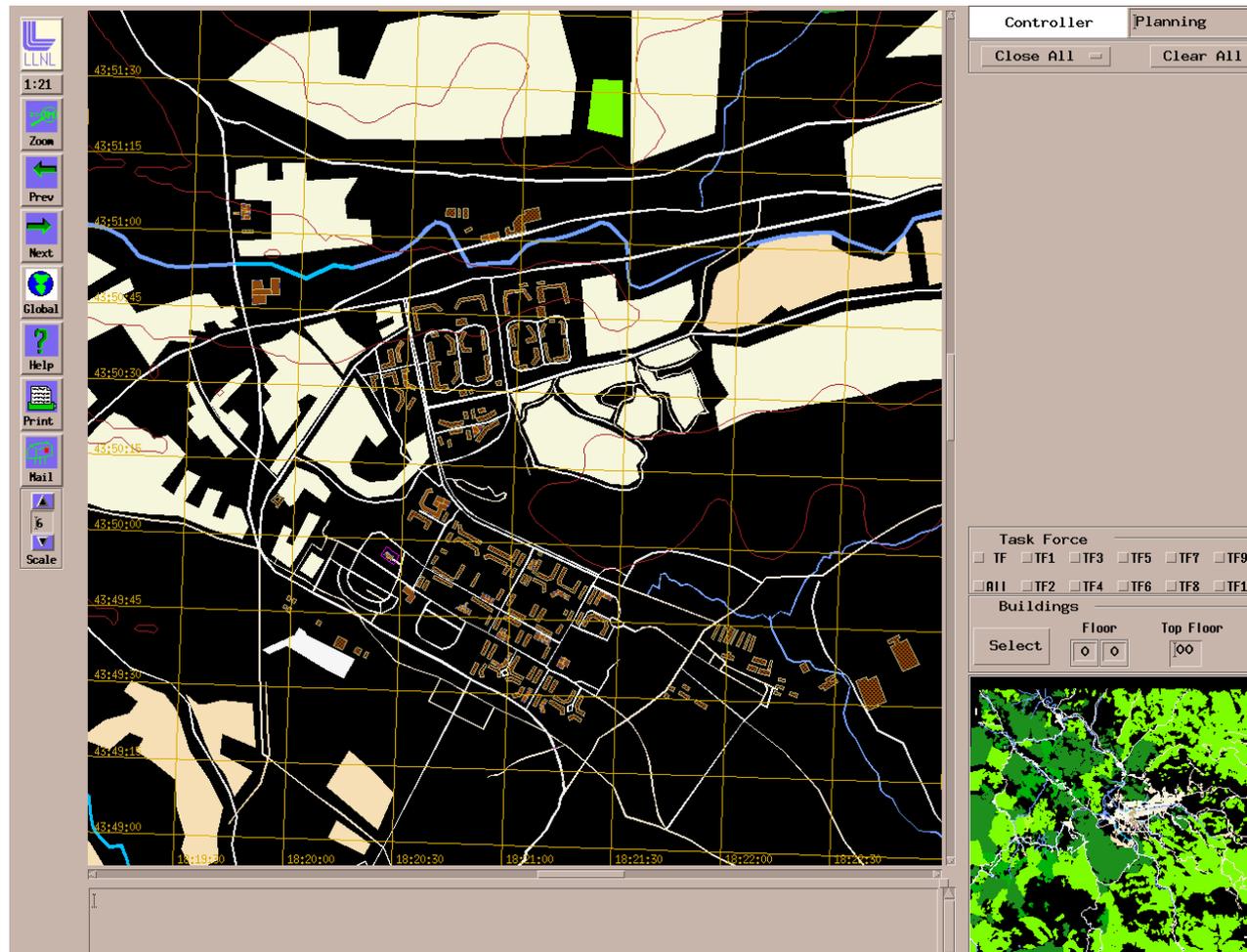
Multi-Echelon/Multi-Resolution



Terrain Cultural Features

Add Cultural Features

- **Buildings**
 - Exterior
 - Interior
- **Underground Structures**
 - Tunnels
 - Subways
 - Sewers
 - Caves
 - Parking Lots
 - Bunkers
- **City structures**
- **Highways**
- **Bridges**
- **Runways**



Sarajevo

10.03.2003

SIM/C4 Program Strategy

UNCLASSIFIED

27

Replicating Complexes



**Wurtsmith AFB USA
(Decommissioned)**

**Wurtsmith AFB USA
(JCATS Image)**

10.03.2003

SIM/C4 Program Strategy

Possible Scenarios

- **Terrorist Attacks**
- **Civil Disturbance**
- **Disaster Relief**
- **Noncombatant Evacuation**
- **Direct Action**
- **Forcible Entry**
- **Border and Coastal Defense**
- **Search and Rescue**
- **Domestic Disaster Response**
- **Law-Enforcement Support**

Web - Enabled JTLS

Concept

Creation of a web-based player interface that uses a standard web browser to present information to an instructor/controller (I/C) and serves as an interface to send orders back to JTLS. It permits the distribution of JTLS player stations to remote locations using the remote command's existing computer assets without the need to install specialized software.

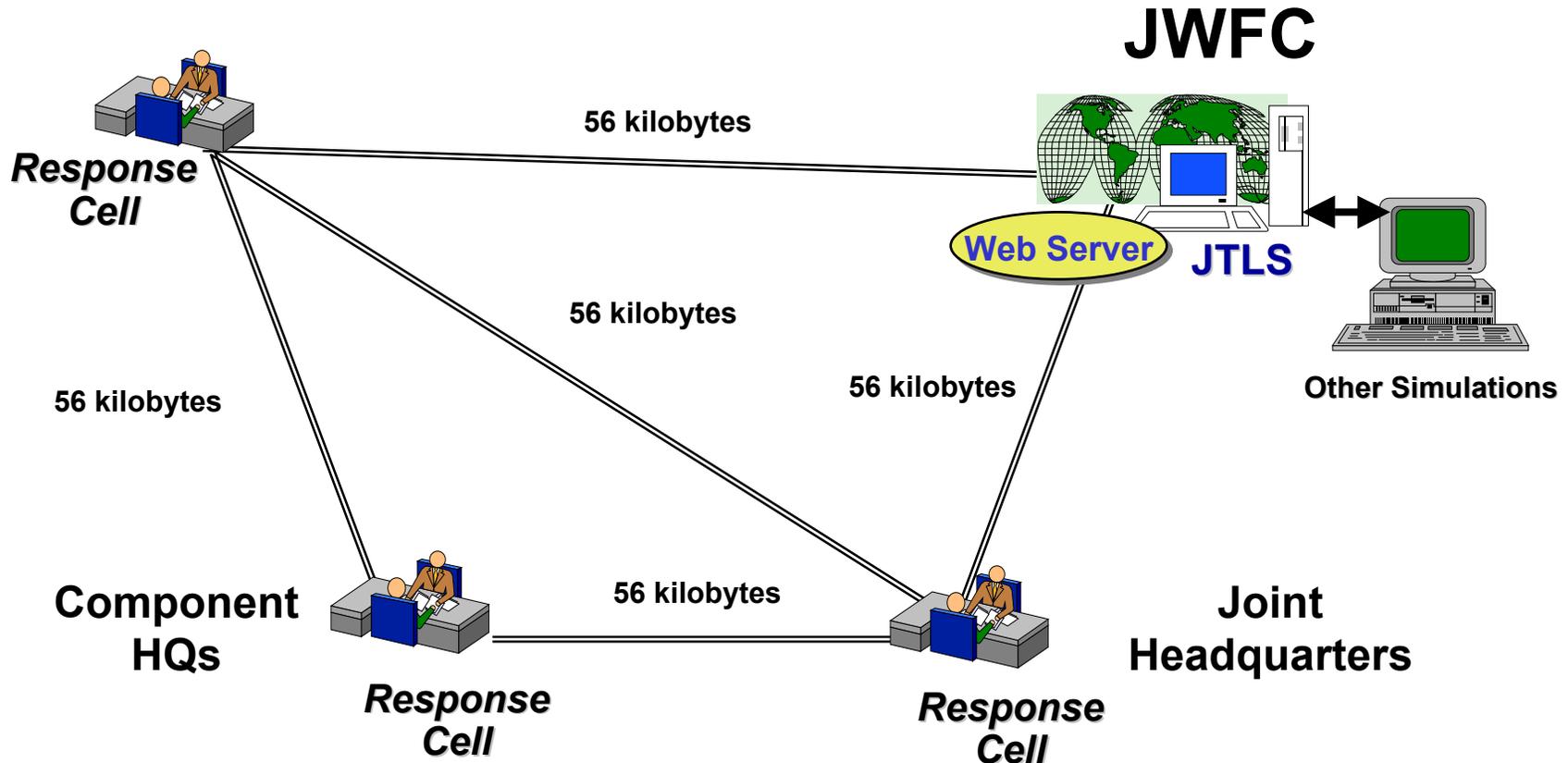
Objectives

- **Web-Enabled Interface and Architecture with functionality greater than what is now available**
- **Reduce costs in personnel and equipment to support exercises**
- **Increase the JWFC ability to support distributed exercises**

Level of Effort

- **Delivered Phase I (prototype) for AGILE RESONSE 03**
- **Complete Phase II Development by early Dec 03 assuming \$500K funding**

Web-Enabled Architecture



- One architecture supports multiple, simultaneous events at multiple sites
- Other simulations can be federated and accessed via Web-Enabled JTLS
- Web-enabled distribution offers lowest cost in bandwidth and footprint

JCATS for Live, Virtual and Constructive Simulation

Concept

- **Provide enhanced JCATS functionality and support for federations of live, virtual and constructive simulations in multiple operational and technical environments**

Objectives

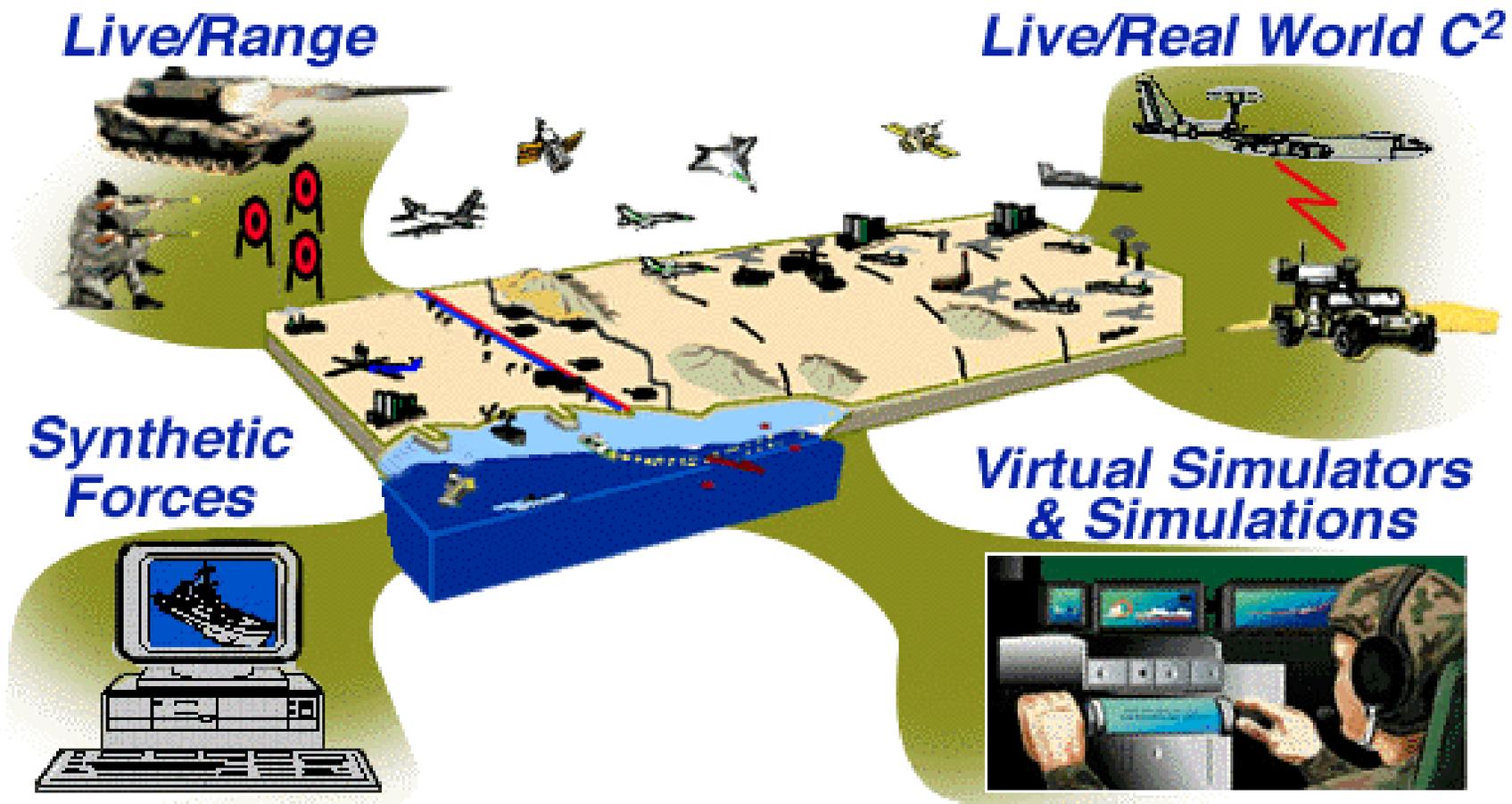
- **Create an “off-the-shelf,” capability to federate live, virtual and constructive simulations for training and mission rehearsal**
- **Provide capability to integrate C4ISR command post crew simulators into JTF training and rehearsal events**

Level of Effort and way ahead

- **Build on SOCOM, USAREUR, Army CTC and MC02 success with JCATS**
- **Initial rough order of magnitude is \$250K x 24 Months, with one interim release in FY04 and second release in FY05**

Distributed Joint Exercises

Fully integrated federation of live, virtual, and constructive simulation



Rapid Database Development

Concept

Joint Forces require Rapid, Distributed Database Development (RD3) for modeling and simulation events, particularly those conducted in a federated environment.

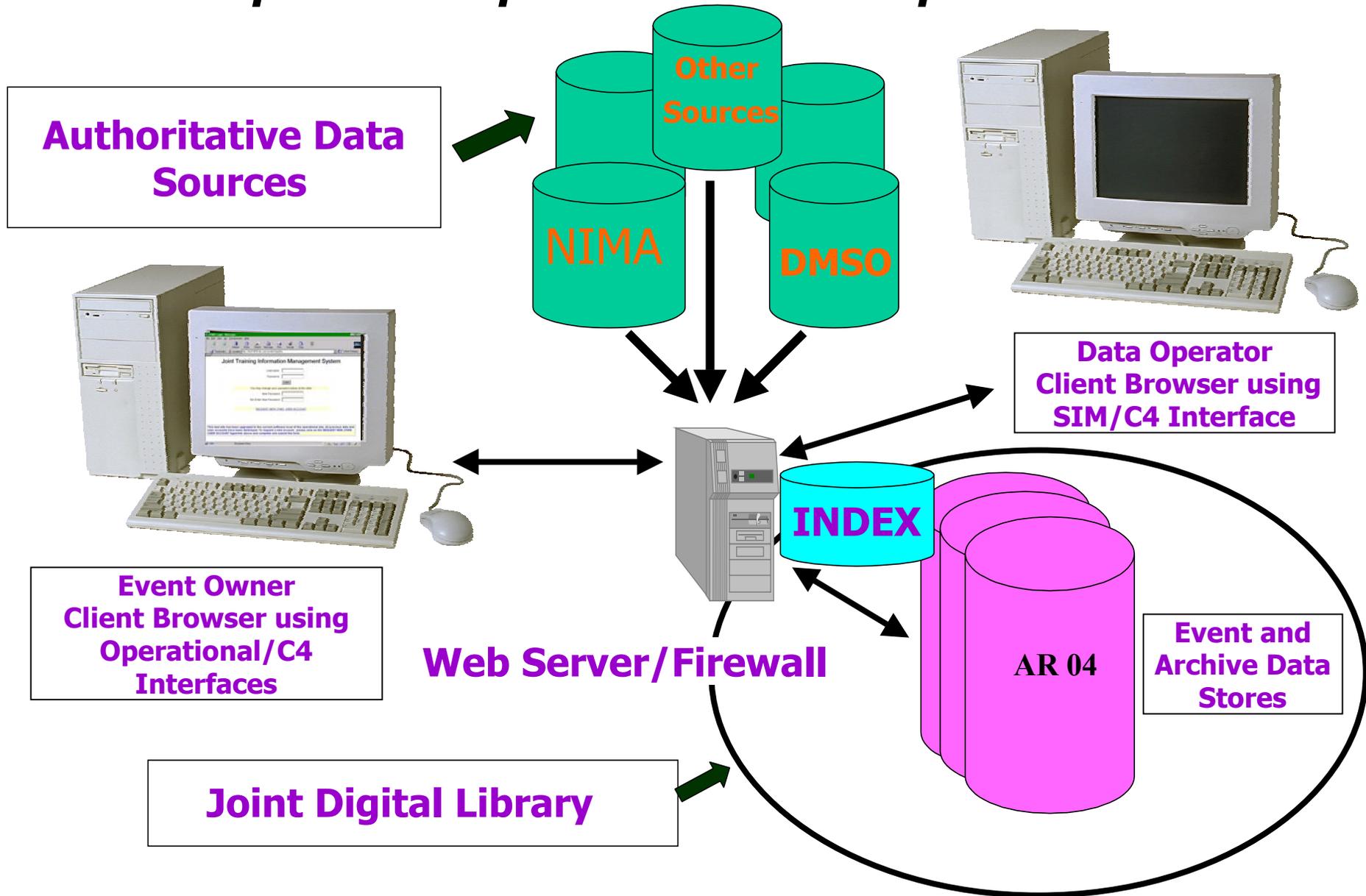
Objectives

- **Increased data accuracy across Conceptual Model of the Mission Space (CMMS).**
- **More responsive Joint Event Life Cycle (JELC) by reducing event development time line.**
- **Increased training objective currency which better integrates with Joint Training System.**
- **Utility of simulations for mission support (i.e. planning and rehearsal).**
- **Increased flexibility for training support (e.g. integration of live, virtual and constructive simulation).**

Level of Effort and way ahead

- **Can leverage Government and Commercial Off-the-Shelf Technologies (GOTS and COTS) database development programs, which can be paired with state of the art, web-enabled technologies**
- **Will require increased cooperation to establish reliable, authoritative data sources**

Proposed Rapid Database Implementation



Questions?

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